

Overview

Useful For

Confirming the presence of the listed synthetic glucocorticoids

Confirming the cause of secondary adrenal insufficiency

Method Name

Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

Urine

Specimen Required

**Supplies:** Urine tubes, 10 mL (T068)

**Container/Tube:** Plastic, 10-mL urine tube

**Specimen Volume:** 5 mL

Collection Instructions:

- 1. Collect a random urine specimen.
- 2. No preservative.

Specimen Minimum Volume

0.6 mL

Reject Due To

All specimens will be evaluated at Mayo Clinic Laboratories for test suitability.

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Frozen	14 days	

Clinical & Interpretive

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**Clinical Information**

Synthetic glucocorticoids are widely used and have important clinical utility both as anti-inflammatory and immunosuppressive agents. The medical use of these agents, as well as their surreptitious use, can sometimes lead to a confusing clinical presentation. Patients exposed to these steroids may present with clinical features of Cushing syndrome but with suppressed cortisol levels and evidence of hypothalamus-pituitary-adrenal axis suppression.

**Reference Values**

Negative

Cutoff concentrations

Betamethasone: 0.10 mcg/dL

Budesonide: 0.20 mcg/dL

Dexamethasone: 0.10 mcg/dL

Fludrocortisone: 0.10 mcg/dL

Megestrol acetate: 0.10 mcg/dL

Methylprednisolone: 0.10 mcg/dL

Prednisolone: 0.10 mcg/dL

Prednisone: 0.10 mcg/dL

Triamcinolone acetonide: 0.10 mcg/dL

Values for normal patients not taking these synthetic glucocorticoids should be less than the cutoff concentration (detection limit).

**Interpretation**

This test screens for and quantitates, if present, the following synthetic glucocorticoids: betamethasone, budesonide, dexamethasone, fludrocortisone, megestrol acetate, methylprednisolone, prednisolone, prednisone, and triamcinolone acetonide.

The presence of synthetic glucocorticoids in urine indicates current or recent use of these compounds. Since several of these compounds exceed the potency of endogenous cortisol by 1 or more orders of magnitude, even trace levels may be associated with cushingoid features.

**Cautions**

This method cannot detect all synthetic steroids available either as pharmaceutical compounds or chemicals present in food. The assay confirms only the listed synthetic glucocorticoids. For more information see Interpretation.

Lack of detection does not preclude use of synthetic glucocorticoid because adrenal suppression may persist for some time after the exogenous steroid is discontinued.

**Clinical Reference**

1. Cave A, Arlett P, Lee E. Inhaled and nasal corticosteroids: factors affecting the risks of systemic adverse effects. *Pharmacol Ther.* 1999;83(3):153-179
2. Bijlsma JWJ, Van Everdingen AA, Huisman M, De Nijs RNJTL, Jacobs JWG. Glucocorticoids in rheumatoid arthritis: effects on erosions and bone. *Ann NY Acad Sci.* 2002;966:82-90
3. Sandborn WJ. Steroid-dependent Crohn's disease. *Can J Gastroenterol.* 2000;14 Suppl C:17C-22C
4. Benvenuti S, Brandi ML. Corticosteroid-induced osteoporosis: pathogenesis and prevention. *Clin Exp Rheumatol.*

2000;18(4 Suppl 20):S64-S66

5. Loke TK, Sousa AR, Corrigan CJ, Lee TH. Glucocorticoid-resistant asthma. *Curr Allergy Asthma Rep.* 2002;2(2):144-150

6. Fardet L, Petersen I, Nazareth I. Monitoring of patients on long-term glucocorticoid therapy: a population-based cohort study. *Medicine (Baltimore).* 2015;94(15):e647. doi:10.1097/MD.0000000000000647

7. Cronin JJ, McCoy S, Kennedy U, et al. A randomized trial of single-dose oral dexamethasone versus multidose prednisolone for acute exacerbations of asthma in children who attend the emergency department. *Ann Emerg Med.* 2016;67(5):593-601.e3. doi:10.1016/j.annemergmed.2015.08.001

## Performance

### Method Description

The synthetic glucocorticoids are extracted from 0.5 mL of urine using an acetonitrile protein precipitation followed by methylene chloride liquid extraction of the solvent. Cortisol-9, 11, 12, 12-d, and triamcinolone-d1 acetonide-d6 are added to each sample before the liquid extraction and serve as the internal standards. Then, 17 mL of the reconstituted sample extract is injected into a high-performance liquid chromatography system and analyzed by tandem mass spectrometry. The mass spectrometer has an electrospray interface and is operated in the multiple reaction monitoring positive mode. The calibration utilizes a 4-point standard curve over a concentration range of 0 to 25 mcg/dL.(McWhinney BC, Ward G, Hickman PE. Improved HPLC method for simultaneous analysis of cortisol, 11-deoxycortisol, prednisolone, methylprednisolone, and dexamethasone in serum and urine. *Clin Chem.* 1996;42:979-981; Savu S, Silvestro L, Haag A, Sorgel F. A confirmatory HPLC-MS/MS method for ten synthetic corticosteroids in bovine urines. *J Mass Spectrom.* 1996;31[12]:1351-1363; Djedovic NK, Rainbow SJ. Detection of synthetic glucocorticoids by liquid chromatography-tandem mass spectrometry in patients being investigated for Cushing's syndrome. *Ann Clin Biochem.* 2011;48[Pt 6]:542-549. doi:10.1258/acb.2011.010250)

### PDF Report

No

### Day(s) Performed

Wednesday

### Report Available

5 to 11 days

### Specimen Retention Time

3 months

### Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

## Fees & Codes

Fees

- Authorized users can sign in to [Test Prices](#) for detailed fee information.
- Clients without access to Test Prices can contact [Customer Service](#) 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact [Customer Service](#).

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

80299

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
SGSU	Synthetic Glucocorticoid Screen, U	46959-3

Result ID	Test Result Name	Result LOINC® Value
23562	Betamethasone	46946-0
23563	Budesonide	46947-8
23564	Dexamethasone	46948-6
23565	Fludrocortisone	46949-4
23569	Megestrol Acetate	46953-6
23570	Methylprednisolone	46954-4
23571	Prednisolone	46955-1
23572	Prednisone	46956-9
23574	Triamcinolone Acetonide	46958-5